What is claimed is:

1. A method for forming a fusion bond between polymeric materials comprising the steps of:

forming a bond site by positioning a portion of a first polymeric body with respect to a portion of a second body so that a fusion bond site is formed;

directing laser energy onto at least a portion of the first polymeric body within the bond site so that a fusion zone having an increased temperature is formed, the laser energy being directed to the bond site to provide a controllable emissive power spectrum of the fusion zone;

detecting the emissive power spectrum of infrared radiation being emitted from the fusion zone while directing the laser energy onto the bond site;

converting the detected emissive power spectrum of infrared radiation into an electrical signal; and

controllably adjusting the laser energy that is directed onto the bond site based on the electrical signal to controllably obtain an emissive power spectrum of infrared radiation emitted from the fusion zone.

2. The method of claim 1, wherein the second body is a polymeric body.

3. The method of claim 1, wherein the second body is a stainless steel body.

4. The method of claim 1, wherein the first polymeric body of the forming step is a tubular catheter and the second body of the forming step is a polymeric dilatation balloon.

5. The method of claim 1, wherein the directing step comprises directing laser energy provided by a laser beam from CO_2 laser, the laser energy having a wavelength of about 10.6 microns.

6. The method of claim 1, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at an angle between about 45 degrees and about 90 degrees.

7. The method of claim 1, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

8. The method of claim 1, wherein the detecting step comprises detecting the emissive power spectrum of infrared radiation being emitted from the fusion zone by a radiation detecting device.

9. The method of claim 8, wherein the radiation detecting device comprises a mercury-cadmium-telluride detector.

10. The method of claim 1, wherein the directing step further comprises directing the laser energy to the bond site with a mirror.

11. The method of claim 10, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

12. The method of claim 11, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at an angle between about 45 degrees and about 90 degrees.

13. The method of claim 12, wherein the detecting step comprises detecting the emissive power spectrum with a detector positioned on axis with at least a portion of the laser beam that is directed to the bond site.

14. The method of claim 13, wherein the mirror is a dichroic mirror.

15. The method of claim 1, wherein the controllably adjusting step comprises operatively connecting a control system to a detector by a signal based connection and operatively connecting the control system to a laser by a signal based connection.

16. The method of claim 15, further comprising providing an output signal from the control system for receipt of the laser by using a process control algorithm for controllably adjusting the power of the laser energy in response to the electrical signal of the converting step.

17. The method of claim 16, wherein the process control algorithm is a PID control algorithm.

18. The method of claim 1, further comprising directing the laser energy to an optical system with a first mirror, refocusing the laser beam to a predetermined shape with the optical system, and directing the laser energy to the bond site with a second mirror.

19. The method of claim 18, wherein the optical system comprises a first lens and a second lens for refocusing the laser energy as a hollow cylinder.

20. The method of claim 19, wherein the first mirror is a dichroic mirror and the second mirror is a parabolic mirror.

21. The method of claim 20, further comprising improving the signal to noise ratio of the detected infrared radiation by optically modulating and amplifying the infrared radiation and filtering out the radiation which is not modulated.

22. The method of claim 1, wherein the forming step comprises forming a bond site by positioning a portion of a first tubular catheter component with respect to a portion of a second tubular catheter component so that a substantially circular fusion bond site is formed.

23. The method of claim 1, wherein the forming step comprises forming a bond site by positioning a portion of a tubular catheter component with respect to portion of a dilatation balloon so that a substantially circular fusion bond site is formed.

24. An apparatus for forming a fusion bond between a component comprising a polymeric material and at least one additional component, the apparatus comprising:

a workpiece support for supporting and positioning a portion of a first workpiece body with respect to a portion of a second workpiece body so that a fusion bond site is formed;

a laser operatively positioned for directing a laser beam toward at least a portion of the bond site so as to form a fusion zone having an increased temperature, the laser comprising an adjustable power output laser;

a detector operatively positioned for detecting infrared radiation emitted from a fusion zone while a bond site comprising at least a portion of the polymeric material component is illuminated by the laser beam, wherein the infrared radiation has an emissive power spectrum that can be substantially correlated with the temperature of the fusion zone, and the detector includes a signal generator for creating a detector signal based on the emissive power spectrum; and

a control system for receiving the detector signal and for sending a control signal to the laser for adjusting the power of the laser beam to obtain a predetermined emissive power spectrum for the infrared radiation being emitted from the fusion zone.

25. The apparatus of claim 24, wherein the first workpiece body is a polymeric body.

26. The apparatus of claim 24, wherein the first workpiece body is a polymeric body and the second workpiece body is a polymeric body.

27. The apparatus of claim 26, wherein the first polymeric body is a tubular catheter and the second polymeric body is a dilatation balloon.

28 The apparatus of claim 24, wherein the laser is a CO_2 laser having a wavelength of about 10.6 microns.

29. The apparatus of claim 24, wherein the laser is positioned such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

30. The apparatus of claim 24, wherein the laser is positioned such that the laser beam impinges on the bond site at an angle between about 45 degrees and about 90 degrees.

31. The apparatus of claim 24, wherein the detector is a mercury-cadmium-telluride detector

32. The apparatus of claim 24, further comprising a mirror for directing the laser beam wherein the mirror is positioned such that the laser beam impinges on the bond site.

33. The apparatus of claim 32, wherein the mirror is positioned such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

34. The apparatus of claim 33, wherein the detector is positioned on axis with a portion of the laser beam that is directed to the bond site.

35. The apparatus of claim 34, wherein the mirror is a dichroic mirror.

36. The apparatus of claim 24, wherein the control system is operatively connected to the detector by a signal based connection and wherein the control system is operatively connected to the laser by a signal based connection.

37. The apparatus of claim 36, wherein the control system utilizes a process control algorithm for providing an output signal for controllably adjusting the power of the laser beam in response to an input signal from the detector.

38. The apparatus of claim 37, wherein the process control algorithm is a PID control algorithm.

39. The apparatus of claim 24, further comprising an optical system for refocusing the laser beam to a predetermined shape and further comprising a mirror for directing the laser beam to the optical system and a mirror for directing the laser beam to the bond site after the laser beam leaves the optical system.

40. The apparatus of claim 39, wherein the optical system comprises a first lens and a second lens for refocusing the laser beam as a hollow cylinder.

41. The apparatus of claim 40, wherein the mirror is a parabolic mirror.

42. The apparatus of claim 24, further comprising an optical chopper and a lock-in amplifier for improving the signal to noise ration of the detected thermal radiation.

43. A method for forming a fusion bond between a plurality of components of a balloon catheter system comprising the steps of:

forming a bond site by positioning a portion of a tubular catheter component with respect to a portion of a dilatation balloon so that a substantially circular fusion bond site is formed;

directing laser energy onto at least a portion of the bond site so that a fusion zone having an increased temperature is formed, the laser energy being directed to the bond site to provide an emissive power spectrum of the fusion zone;

detecting the emissive power spectrum of infrared radiation being emitted from the fusion zone while directing the laser energy onto the bond site;

converting the detected emissive power spectrum of infrared radiation into an electrical signal; and

controllably adjusting the laser energy that is directed onto the bond site based on the electrical signal to controllably obtain an emissive power spectrum of infrared radiation emitted from the fusion zone.

44. The method of claim 43, wherein the tubular catheter component is a polymeric catheter component.

45. The method of claim 43, wherein the directing step comprises directing laser energy provided by a laser beam from CO_2 laser, the laser energy having a wavelength of about 10.6 microns.

46. The method of claim 43, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at an angle between about 45 degrees and about 90 degrees.

47. The method of claim 43, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

48. The method of claim 43, wherein the detecting step comprises detecting the emissive power spectrum of infrared radiation being emitted from the fusion zone by a radiation detecting device.

49. The method of claim 48, wherein the radiation detecting device comprises a mercury-cadmium-telluride detector.

50. The method of claim 43, wherein the directing step further comprises directing the laser energy to the bond site with a mirror.

51. The method of claim 50, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at a substantially normal angle of incidence.

52. The method of claim 51, wherein the directing step comprises directing laser energy as a laser beam such that the laser beam impinges on the bond site at an angle between about 45 degrees and about 90 degrees.

53. The method of claim 52, wherein the detecting step comprises detecting the emissive power spectrum with a detector positioned on axis with a portion of the laser beam that is directed to the bond site.

54. The method of claim 53, wherein the mirror is a dichroic mirror.

55. The method of claim 43, wherein the controllably adjusting step comprises operatively connecting a control system to the detector by a signal based connection and operatively connecting the control system to a laser by a signal based connection.

56. The method of claim 55, further comprising providing an output signal from the control system by using a process control algorithm for controllably adjusting the power of the laser energy in response to the electrical signal of the converting step.

57. The method of claim 56, wherein the process control algorithm is a PID control algorithm.

58. The method of claim 43, further comprising directing the laser energy to an optical system with a first mirror, refocusing the laser beam to a predetermined

shape with the optical system, and directing the laser energy to the bond site with a second mirror.

59. The method of claim 58, wherein the optical system comprises a first lens and a second lens for refocusing the laser energy as a hollow cylinder.

60. The method of claim 59, wherein the first mirror is a dichroic mirror and the second mirror is a parabolic mirror.

61. The method of claim 43, further comprising improving the signal to noise ration of the detected infrared radiation by optically modulating and amplifying the infrared radiation and filtering out the radiation which is not modulated.